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Establishing Operations, Cognition, and Emotion

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In this paper we argue that behavior analysts have tended to neglect the study of important aspects of complex human behavior, including cognition and emotion. This relative neglect has been costly in terms of mainstream psychology's perception of the field of behavior analysis and in terms of our ability to provide a more thorough account of human behavior. Observations and findings from the clinical context are offered as examples of behavior that are not readily explained by the three-term contingency, and we argue that an adequate account of these behaviors must include principles derived from recent behavior-analytic work, in particular a better understanding of the short- and long-term effects of establishing operations. The concept of the establishing operation and its implications for understanding complex human behavior are discussed.

Key words: establishing operations, setting events, emotion, cognition, three-term contingency

THE RELATIVE NEGLECT OF COGNITION AND EMOTION BY BEHAVIOR ANALYSTS

It is common in psychology and in everyday discourse to separate the actions of organisms into three categories: behavior, cognition, and emotion. From this perspective, behavior typically refers to observable acts, and these are usually defined by their form or topography (e.g., Gray, 1999, p. 3). Cognition refers to the activities of the mind or unobservable mental processes (e.g., Ellis & Hunt, 1993, p. 2), and they are usually seen as at least proximal causes of behavior. Emotions are typically defined as bodily or affective states (e.g., Ellis, Ottoway, Varner, Becker, & Moore, 1997) and are often understood as the feelings (Gray, 1999, p. 219) associated with our cognition and behavior. Emotions are sometimes given motivational and even explanatory status. As Skinner (e.g., 1974, chap. 10) has pointed out, there is a common tendency to explain behavior in terms of emotions or other "inner causes," and this tendency extends to clinical psychologists and other mental health professionals. As an example, a psychologist appearing on a recent television talk show explained the reported alarming rise in the occurrence of "road rage" (violent confrontations among drivers) as resulting from pent-up anger and longstanding feelings of resentment and interpersonal alienation.

In this dominant, tripartite division of the human condition, behavior generally takes a back seat to cognition and emotion. Inasmuch as it is often assumed to be the result of more complex and more interesting cognitive or emotional processes, behavior typically serves as the basis from which inferences are made about those underlying cognitive and emotional processes. In line with the underlying mechanistic, mentalistic, and structuralistic perspective of mainstream psychology, most psychological theories that attempt to explain cognition and emotion offer essentially metaphorical descriptions of inferred structures or processes. Once described, these processes are used to derive predictions of behavior that are then subjected to experimental tests. Quite often, the results of these experiments are in accord with the predictions derived from the hypothesized structures and processes, and the model or theory that postulates their existence and function is thus considered to be

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supported (see Donahoe & Palmer, 1994, pp. 8–10).

In line with the underlying contextualistic and functionalistic perspective of behavior analysis, behavioral theories have taken a different approach. Although it is commonly and erroneously accused of ruling out private events such as thinking and feeling on scientific grounds, behavior analysis instead views these as instances or aspects of behavior and then seeks to discover their determinants and reciprocal influence (e.g., Moore, 1980; Skinner, 1953, 1974). It could be argued, however, that although behavior analysis certainly makes room for the study of cognition and emotion, these issues have not captivated the field. Although there does appear to be increasing interest among some behavior analysts in topics that fall under the general rubric of cognition (e.g., rule governance, category learning, stimulus equivalence, relational responding, verbal behavior, choice, and decision making), these topics can hardly be said to dominate the field, and the work that has been done has had relatively little impact on mainstream psychology. Furthermore, emotion and the relation between emotion and cognition are hardly studied at all. Some might argue that this is as it should be; Skinner, after all, categorized emotions as epiphenomena (Skinner, 1971, p. 12), and many behavior analysts since have acted as if emotions are unimportant. But even if emotions are not considered to be adequate explanations of behavior, that does not mean that it is unimportant to understand the determinants of emotional responding or the role of emotional responding in complex behavior.

Although we agree that the way that cognition and emotions are typically studied and understood in other fields of psychology is problematic, we disagree with the conclusion that these phenomena are unimportant or should be ignored. When behavior analysts ignore or neglect what other serious behavioral scientists see as important topics of study, they do themselves a disservice. As a field, behavior analysis already has a substantial public relations problem. Like it or not, from the outside, behavior analysis is sometimes seen as more of a cult than a scientific community (e.g., Mahoney, 1989), and failing to fully address the phenomena that many consider to be the most interesting characteristics of the human condition only adds to this perception. As stated in most introductory texts and revealed even in casual conversations with nonbehavioral psychologists, the common view of behavior analysis is that it restricts its subject matter to relatively simple, publicly observable behavior, explains behavior almost exclusively in terms of immediate reinforcement contingencies, and is generally unconcerned with the richness and complexity of the human condition. This is, of course, an inaccurate portrayal of the true behavior-analytic position, and several writers have tried to correct this misrepresentation. As early as 1950, Keller and Schoenfeld presented a behavior-analytic view of emotional responding, and Skinner (e.g., 1953, 1974) directly addressed such topics as thinking, perceiving, knowing, emotion, motivation, the self, and personality. Still, it would be difficult to argue that the field has followed up with the conceptual or experimental analyses that would allow an adequate understanding of these phenomena. Now, we are not arguing that behavior analysts ought to adopt the topics and methods of mainstream psychology. We agree, however, with Anderson, Hawkins, Freeman, and Scotti (2000) that more behavior analysts should attend to a broader range of topics than they are looking at now, including those complex areas of human functioning, cognition and emotion, that have captivated the attention of mainstream psychology.

It is interesting that, except for the discussant, the contributors to this set of articles are all clinical behavior analysts. That is, they work with verbally competent humans in clinical contexts. One reason that clinical behavior ana-

lysts might be particularly interested in seeing behavior analysis extend its focus is that clinical work provides frequent opportunities to observe very complex and often highly emotional human behavior. In addition, these observations are often accompanied by clients' obviously subjective, but often very detailed, reports of their personal histories. With enough observations, certain commonalities in response styles and in the relations between response styles and reported histories among clients with similar clinical problems become apparent. Many of these observations, however, are not readily explainable in terms of the three-term contingency, and there is not much in the behavior-analytic literature that addresses or helps one to understand the behavior observed in these contexts. For example, almost anyone who has worked with depressed clients will have observed that they differentially attend to (come under the control of) aversive or potentially aversive current and past events, and that this differential attention correlates with the clients' affective states. The more depressed their affect, the greater the tendency to attend to and report negative events and memories. Another observation with depressives is the very restricted range of events that serve as effective reinforcers and the tendency for the size of this range to covary with affective state. More generally, past experiences, even those that are historically remote, often appear to have a sustained impact on clients' behavior, even when this behavior results in aversive consequences. Another common observation is that simply talking about disturbing or traumatic experiences such as assault, abuse, or the death of a spouse can substantially alleviate the negative impact of those experiences.

We are not contending that there are no behavior-analytic explanations for these observations. However, we contend that an adequate behavioral explanation requires an appeal to behavioral principles and processes that go beyond the three-term contingency and rely to a large extent on concepts that have been relatively neglected. In particular, we argue that adequate accounts of these observations require inclusion of behavior-analytic concepts that fall under the general heading of cognition, emotion, and motivation. More specifically, they require inclusion of the concepts of stimulus equivalence or relational responding and establishing operations. One article in this set, by Wilson and Hayes (2000), focuses on the role of stimulus equivalence and relational responding. Accordingly, except for a brief description of stimulus equivalence later in the paper, we focus on the role of establishing operations. After discussing such operations at some length, we show how they may be involved in some clinical phenomena.

ESTABLISHING OPERATIONS

At the risk of being too rudimentary, it may be helpful here to state the definition of *establishing operation* and some of the history related to the use of this and related terms. To our knowledge, Keller and Schoenfeld (1950) first used the term to distinguish motivational effects from reinforcement effects (Chase & Hyten, 1985). Michael (1982) offered a more functionally specific definition of the term in a paper that attempted to distinguish between the discriminative and motivative functions of stimuli. He provided an expanded and more detailed discussion of establishing operations in a subsequent paper (Michael, 1993). According to Michael, establishing operations are environmental events, operations, or stimulus conditions that (a) momentarily establish or potentiate the reinforcing effectiveness of other events and (b) evoke behaviors relevant to those reinforcing events. In the 1993 paper, Michael elaborated upon the evocative effects of establishing operations and specifically mentioned their effects on the evocative functions of relevant discriminative stimuli.

Thus, establishing operations act upon all three elements of the three-term contingency. Food deprivation is an example of an establishing operation. As such, it establishes food and associated conditioned events as effective reinforcers, evokes behaviors that have been previously reinforced with food, and increases the evocative effectiveness of discriminative stimuli that have been associated with the availability of food reinforcers.

Parenthetically, the effects of establishing operations on discriminative stimuli were implied in Michael's 1982 paper, but were not fully articulated until his 1993 paper. From our perspective, this is an important addition because, as we try to clarify below, it suggests a behavior-analytic explanation of some interesting findings in the literature concerned with the relation between emotion and cognition. To a large extent, the cognitive phenomena referred to in this literature are essentially examples of differential stimulus control, and both the differential stimulus control and the emotional states described in these studies appear to be the effects of establishing operations.

In addition to establishing operations, Michael also identifies and discusses what he calls abolishing operations. Abolishing operations have the opposite effects of establishing operations. Abolishing operations reduce the probability of certain behaviors, depotentiate certain events as reinforcers, and reduce the discriminative control exerted by certain stimuli. Where food deprivation functions as an establishing operation, food satiation functions as an abolishing operation. It reduces the probability of behavior that has been reinforced with food, depotentiates food as a reinforcer, and decreases the discriminative control exerted by stimuli correlated with the availability of food reinforcers.

Although we have focused on the term *establishing operations* to refer collectively to function-altering factors outside the three-term contingency, it should be pointed out that other terms have been used to refer to these same factors. Goldiamond (1983), for example, used the term *potentiating variables,* and Hawkins (1986) used the term *motivating variables,* although he referred to their potentiating and depotentiating effects on consequent stimuli. Before that, Kantor (1959) used the term *setting factors,* which he defined as those circumstances that influence which stimulus–response relations would occur out of all those currently comprising a person's behavioral repertoire built up through past person–environment interactions. In their classic behavioral text on child development, Bijou and Baer (1961) used the term *setting events,* which they described as follows: "In contrast to stimulus events, setting events are more complicated than the simple presence, absence or change of a stimulus. . . . Instead, a setting event is a stimulus–response interaction, which simply because it has occurred will affect other stimulus–response relationships which follow it" (p. 21). Leigland (1984) reviewed the various terms that have been used in reference to the class of variables that determine the effectiveness of contingencies, and suggested that *setting events* and *setting factors* may be too general and functionally vague to suffice as technical terms. He argues that, as Michael defines it, *establishing operation* is more functionally specific and, therefore, preferable as a technical term. We agree and, for that reason, have opted to use the term *establishing operations* rather than *setting events* or *setting factors* in the present paper. Also, for purposes of convenience, we will use establishing operations in the present paper to collectively refer to both establishing and abolishing operations, unless specifically referring to the abolishing effects of a particular operation.

Behavior analysts who have written on the topic have mentioned a number of different operations, procedures, and events that might function as establishing operations. Kantor (1959), Bijou (1976), and Bijou and Baer (1961)

identified three classes of events consisting of (a) physiological conditions (e.g., conditions of deprivation or satiation, illness or health, amount of rest, presence or absence of drugs), (b) durational events (e.g., presence or absence of certain events, objects, or persons; instructions or verbal statements; production requirements in a work setting; ambient noise or ambient temperature), and (c) behavioral histories (e.g., family interactions before arriving at work or school, previous experience with existing contingencies, the development of relevant behavioral repertoires). Hawkins (1986) lists five types of manipulations that could serve as establishing operations, and suggests that these might be helpful to consider when developing programs to change targeted behaviors. His five categories are chemical, health, emotional, precurrent stimuli, and learning. Michael (1993) also identified a number of potential establishing operations, including deprivation, aversive stimulation, temperature changes, variables related to sexual reinforcement, a range of operations that produce emotions, and conditioned establishing operations.

Taken together, these authors have identified a very broad range of events, operations, and conditions that might function as establishing operations. Yet, despite the early identification of the importance of establishing operations and the broad range of events that function as such, behavior analysts have given relatively little conceptual or empirical attention to the role of establishing operations in understanding or modifying human behavior. As Hawkins (1986) and Michael (1982, 1993) point out, the two establishing operations that have received the most attention are deprivation and aversive stimulation (e.g., Keller & Schoenfeld, 1950; Skinner, 1938, chap. 9 and 10; 1953, chap. 9 and 11; 1957, pp. 28–32, 212–214). As of 1981, Wahler and Fox could find only a handful of studies in the applied behavior analysis literature (Fowler & Baer, 1981; Peterson, Merwin, Mayer, & Whitehurst, 1971; Rincover & Koegel, 1975; Wahler, 1980; Wahler & Fox, 1980) that had specifically manipulated setting events in an attempt to modify behavior. Since then, the number of studies that have specifically examined establishing operations remains comparatively small, despite reported successes and specific calls for this kind of research (Gardner, Karan, & Cole, 1984; Halle & Spradlin, 1993; Horner, Vaughn, Day, & Ard, 1996). This appears to be an important gap in the behavior-analytic literature.

In their discussion of setting events, Wahler and Fox (1981) echo Kantor's (1959) "friendly" criticism that the experimental analysis of behavior has unduly emphasized the relatively simple and temporally proximate conditions that control behavior. They call for a conceptual and methodological expansion of behavior analysis that would include more complex and temporally distant environment–behavior relations and descriptive as well as experimental analyses. In that regard, they consider Bijou and Baer's (1961) definition of setting events to be especially important in that it emphasized the definition of setting events as stimulus–response interactions and acknowledged the importance of factors that occur separate in space and time from the stimulus–response relations they influence.

On the Duration of the Effects of Establishing Operations

The importance of considering temporally distant factors raises the issue of whether the effects of establishing operations are momentary (Michael, 1982, 1993). Although the meaning of *momentary* is not specified, the term implies that the effects are brief and dissipate rather quickly. But why must this be so? What behavioral principles mandate that the effects of establishing operations cannot be much longer, perhaps weeks, months, or even years? If it is possible for reinforcement to produce changes in behavior that last for years, why is it not also possible for

establishing operations to have long-lasting effects on the events that function as reinforcers (see Hawkins, 1986)?

Wahler and Fox (1981) argue that behavior analysts hold a "conceptual bias" about time in their search for functional relations (p. 332). The emphasis has been on brief temporal relations between stimuli and responses or the effects of immediate contingencies. They suggest that it seems reasonable to put aside this bias in the study of setting events, and add that it is conceivable that setting events could be functional for hours. We certainly agree, but go on to ask, why restrict it to hours?

The assumption that establishing operations have momentary effects may be related to the relative emphasis placed on deprivation and aversive stimulation compared to the list of other events that might function as establishing operations. The establishing effects of mild or moderate food deprivation or shock, for example, probably are short lived. Once an organism has eaten or the shock has been terminated, the relevant contingencies are no longer potentiated. But that does not mean that the effects of all establishing operations or even severe levels of deprivation and aversive stimulation are momentary. If we examine the range of establishing operations suggested by Kantor (1959), Bijou and Baer (1961), Hawkins (1986), and Michael (1982), it is clear that some of them could conceivably have very long-term effects. For example, events that elicit strong emotional reactions, such as the death of loved one, rape, abuse, or the events that lead us to "fall in love," are examples of establishing operations with long-term effects. So are verbal statements or rules such as "Stay away from snakes, they can be poisonous," "Stay away from behaviorism, it rejects the study of thoughts and feelings and believes people should be programmed like robots," or "Eating undercooked pork will make you sick." The respondent conditioning procedures employed in such therapeutic interventions as systematic desensitization and covert sensitization essentially alter the positive and negative reinforcing functions of specific stimuli and can also be viewed as examples of establishing operations with long-term effects (Dougher, Crossen, & Garland, 1986). Rather than being ephemeral, it may be that the effects of some establishing operations persist until they are supplanted or modified by other events. Just as the establishing effects of food deprivation continue until the organism eats, the establishing effects of emotion-eliciting events may persist until they are modified by the occurrence of relevant abolishing events. However, because of the paucity of research on establishing operations, all that can be said about the duration of their effects at this point is conjecture.

In what follows, we attempt to show how the concept of the establishing operation might account for some behavioral phenomena that fall under the general heading of cognition and emotion. In particular, we focus on some clinically relevant phenomena, including the commonly reported symptoms of depression and the "cognitive biases" associated with anxiety disorders, some clinical observations of what appear to be temporally distant functional relations, and the reported therapeutic effects of verbalizing distressing experiences.

Establishing Operations and Clinically Relevant Behavior

In a previous paper (Dougher & Hackbert, 1994), we attempted to outline a behavior-analytic account of clinical depression. In that paper we identified three conditions that the depression literature indicates are common antecedents of depression. These are (a) persistently insufficient levels of reinforcement (sometimes due to the lack of an effective repertoire), (b) the loss of a major source of reinforcement, and (c) persistent punishment or

generally high levels of aversive stimulation. We offered a behavior-analytic account of how these antecedent conditions could account for the common symptoms of depression. In so doing we identified three conceptually distinct potential behavioral effects of these conditions.

The first and most obvious effect is that all three may lead to low or decreased rates of appropriate behavior. For example, if repeated attempts to develop social relationships, succeed at work, or win parental approval go largely unreinforced or are frequently met with aversive consequences, the frequency of these behaviors is likely to diminish. The second possible effect of these antecedents is respondent elicitation. Persistent low rates of reinforcement, extinction, or persistent punishment not only reduce the frequency of relevant operants but also can act as unconditioned or conditioned elicitors that produce very strong emotional reactions. Consider, for example, the emotional reactions to the death of a loved one, the termination of a valued relationship or job, the inability to obtain or maintain desired friendships, or having to tolerate constant criticism or physical abuse. These types of situations often elicit feelings of anger, frustration, despair, inadequacy, and self-contempt.

The third effect of these conditions, and the one that we believe has been most often overlooked, is that they may function as establishing (or abolishing) operations. In our previous paper, we attempted to illustrate these effects by heuristically dividing the world into two very general types of reinforcement contingencies: depressive and nondepressive. We described nondepressive contingencies as those that are typically established when individuals are not depressed. They include the interpersonal, occupational, recreational, and social contingencies that characterize most people's daily lives. When there is an adequate repertoire and these contingencies are established, individuals work, play, love, interact, relate, create, recreate, and derive pleasure from these activities and their consequences.

Depressive contingencies, on the other hand, are those that evoke and maintain depressed behavior. By depressed behavior, we are referring to the verbal and nonverbal behavior characteristic of depressed clients. These include excessive crying, complaining, blaming, worrying, self-deprecation, inaccurate rule formulation about existing and future contingencies, inaccurate assessments of one's ability to satisfy existing and future contingencies, social avoidance, drug or alcohol abuse, pessimistic predictions about the future, and sleep, eating, and sexual disturbances. It is our contention that the conditions that often precede depression function as establishing operations in that they establish depressive contingencies and abolish nondepressive contingencies. We already mentioned the behaviors that are often evoked by these conditions, so we will turn our attention now to their effects on behavioral consequences and then to their effects on the discriminative control exerted by relevant stimuli.

The antecedent conditions of depression may establish as effective reinforcers expressions of sympathy, commiseration, reassurance, offers of assistance, or the removal of expectations, demands, or threats of punishment. They may also differentially potentiate the reinforcing effects of food, sleep, isolation, drugs, and alcohol. This may explain why depressives often overeat, oversleep, prefer to stay by themselves, and are prone to drug and alcohol abuse. Just as these conditions may establish certain reinforcers, they may also abolish the reinforcing effects of otherwise highly potent behavioral consequences. Such activities as social interactions, work, and hobbies may not only lose their reinforcing effects but may even become aversive, functioning as negative reinforcers by their offset or as punishers by their onset. The loss of reinforcer effectiveness on

a wide scale is referred to clinically as anhedonia, and it may extend to such primary reinforcers as food and sex.

This anhedonia interferes with the treatment of depressives, which often includes increasing the density of reinforcement in their lives. But increasing the density of reinforcement usually requires clients to be motivated enough to emit the behaviors that produce reinforcing consequences. That is, relevant consequences must be effective reinforcers. It is common, however, to hear depressed clients complain that they just do not care about once potent reinforcers, or they just do not feel like doing what it takes to obtain them. This wide-scale loss of reinforcer effectiveness in itself entails a low density of reinforcement, which, of course, is one of the previously mentioned antecedents of depression. Thus, the abolishing function of the antecedents of depression may cause a self-perpetuating cycle or, as it is more commonly called, a downward spiral of depression.

Another factor that may contribute to a self-perpetuating cycle in depression is the effect of the self-directed verbalizations often emitted by depressed clients. As we mentioned previously, these verbalizations are often very self-critical, self-deprecating, and pessimistic. It is common for depressed clients to make statements like "I'm no good," "I'll never be successful," "Nobody likes to be around me," "I am unlovable," and "Nothing will ever change." Although such statements may be reinforced with sympathy and attention, they can also have conditioned eliciting and establishing functions for the speaker's behavior. The mood-induction literature demonstrates that verbal statements can elicit emotional reactions. In an attempt to study the relation between emotion and cognition, some investigators have employed verbal mood-induction techniques (see Bower, 1981, and Ellis & Ashbrook, 1989, for reviews of this literature). These techniques involve having subjects read a series of statements that are intended to induce specific moods. Statements like "I'm a failure at most things I do" and "Even my parents have difficulty loving me" are intended to induce a depressed mood, whereas "I feel competent, happy, and secure" and "Things just go right for me" are statements intended to induce an elated mood. The effects of these manipulations are typically measured by mood inventories with acceptable psychometric properties. Even when the demand characteristics of these studies are controlled, these procedures have been reported to induce sometimes very significant mood changes in otherwise normal subjects. To the extent that verbally reported mood changes reflect respondent processes, verbal mood-induction procedures can be seen as conditioned elicitors. In the same way, the negative self-statement made by depressives can exacerbate their feelings of sadness and despondence.

Although the establishing functions of mood-induction procedures have not yet been experimentally demonstrated, it is reasonable to speculate that the negative self-statements emitted by depressives would not only affect their mood but would also have establishing and abolishing functions. In the same way that a dinner companion's detailed description of the symptoms produced by a recent bout with the flu might diminish one's appetite for dinner, a round of self-criticism about one's social competence might also diminish the evocative and reinforcing effects of an upcoming social event.

A third factor that may maintain or exacerbate depression is the reaction of other people to the distressed behavior of depressives. Although it may initially be reinforced by expressions of sympathy and concern or the removal of demands, distressed behavior is perceived by others as aversive, and they try to escape or avoid it (Coyne, 1976). This, of course, is a form of extinction, one of the previously mentioned antecedents of depression. It is not difficult to see how this pattern of reinforce-

ment for depressed behavior followed by extinction can lead to deeper levels of depression.

Having discussed the types of behavior evoked by the antecedents of depression and their potential effects on relevant behavioral consequences, we turn our attention now to their effects on relevant discriminative stimuli. Among other so-called "cognitive deficits" (Beck, 1967; Beck, Rush, Shaw, & Emory, 1979; Ellis, 1990; Ellis et al., 1997), a core symptom of depression is the tendency to selectively attend to and remember negative events. When asked to recall a list of words varying in affective content, or the words used in a previously read paragraph, or just to freely recall early memories, depressives tend to differentially remember words and experiences associated with sad and unpleasant affect (Ellis, 1990). When giving self-descriptions, depressives overemphasize their negative characteristics and deemphasize their positive attributes. In social situations, they selectively attend to the negative reactions of others and seem oblivious to positive reactions. Moreover, this selective attention tends to covary with the intensity of depressed affect; the more depressed they are, the more they focus on the negative (Beck, 1967; Beck et al., 1979). This tendency to differentially attend to negative stimuli is also found in normal subjects who have been exposed to the kind of depressed mood-induction procedures described above. In fact, mood-induction procedures have been reported to impair subjects' performance on a range of cognitive tasks including memory, attention, and problem solving (Ellis, Varner, & Becker, 1993).

Although the discussion thus far has focused on depression, it is not the only emotion or affective state related to cognitive performance. McNally (1996) reviewed a series of studies that demonstrate a relation between anxiety and "cognitive bias." Cognitive bias refers to the tendency of anxiety-disordered clients to differentially perceive, attend to, interpret, and remember anxiety-relevant stimuli compared to normal ones. An example of cognitive bias is the difference in reaction times between anxious and normal subjects on emotional Stroop tasks. On these tasks, anxiety-related and non-anxiety-related words are presented in various colors. Subjects are then asked to report the color of the words as quickly as they can. Anxious subjects take longer to name the colors of the anxiety-related words than they do to name the colors of the non-anxiety-related words. Normal subjects show no reaction-time differences to the two sets of words. The assumption is that the anxious subjects unconsciously attend to the anxiety-related words, and that interferes with their reaction times in naming the colors. Memory bias is demonstrated by the differences in performance between anxious subjects and normal subjects on a memory task. When given a list of words to study and later recall, anxious subjects tend to remember more anxiety-related words than non-anxiety-related words. Normal subjects show no differential recall.

Cognitive psychologists have postulated a variety of mental processes (e.g., Ellis, 1990; Ellis et al., 1993) to explain these data, but, in behavioral terms, it appears that they may be explained by appeal to establishing operations. Most of the cognitive tasks employed in these studies assess the stimulus control exerted by the stimuli included in the tasks. In the Stroop test, for example, there are two dimensions of the words that compete for stimulus control: the content of the words and their color. Similarly, the word recall tests used in these studies assess the differential stimulus control exerted by the words on the lists the subjects were asked to recall. Evidently, relevant affect-related words exert more stimulus control than non-affect-related words for clinical subjects but not for normal subjects. It seems reasonable to suggest that the mood-induction procedures and other factors that led to the devel-

opment of the subjects' depression or anxiety disorders served as establishing operations that differentially enhanced the stimulus control exerted by the affect-related stimuli. Just as stimuli that have been correlated with the availability of food gain control over the behavior of a hungry individual, events correlated with relevant potentiated consequences might gain stimulus control over the behavior of depressed and anxious individuals. This is, of course, a post hoc explanation of these results, and direct experimental analyses are required before this claim can be verified. Nevertheless, it seems to be a reasonable assertion, and it points to the importance of establishing operations in understanding interesting findings in the clinical and cognitive literatures.

The Potential Long-Term Effects of Establishing Operations

There are clinical observations that suggest that some experiences can have what appear to be long-lasting establishing and abolishing effects. These include traumatic events like rape, combat, physical assault or abuse, the death of a child's parent, or the death of a parent's child. Rape victims, for example, frequently suffer from nightmares, anxiety reactions, depression, generalized fear and distrust of men, and a loss of interest in any kind of sexual behavior that can last for weeks or even years. But events need not be so extreme or traumatic to have what appear to be long-term establishing and abolishing effects. A clinical example may illustrate this point.

The client was a 27-year-old woman seen by the first author at a university-based outpatient psychology clinic. She had a pleasant appearance and demeanor, was slightly overweight, and worked as a health professional at a local hospital. She came to treatment seeking help in controlling her weight and in feeling more comfortable in interpersonal relationships. She had a few casual friendships and reported one serious romantic relationship that terminated 5 years before when she discovered her boyfriend was involved in a sexual relationship with another woman. Since then, she dated a few men, but these interactions failed to develop into lasting relationships. She had heard from others that the men she dated found her aloof and withholding. She added that her girlfriends also complained that she was emotionally distant and reserved. She went on to say that she was afraid of revealing more of herself to other people for fear of criticism, rejection, and humiliation. She also reported that she was becoming increasingly lonely, depressed, and pessimistic about ever finding a satisfying long-term relationship. When she was most despondent, she would often binge on substantial amounts of junk food, with a particular preference for potato chips.

The client had a difficult history. She was given up for adoption by her biological mother and lived in foster care until she was adopted at the age of 4 years by a couple who was told by their family physician that they would be unable to conceive a child. It was a surprise to everyone when, 2 years later, her adoptive mother became pregnant and gave birth to a girl. Two years after that, she became pregnant again, and this time had a boy. Reportedly, things changed dramatically after the birth of the first child, and deteriorated even more after the birth of the second. The client's adoptive mother grew harsh and demanding, often ridiculing the client and even resorting to physical punishment for minor infractions. The client was made to feel unwanted. She was given a disproportionate number of household chores and received just the bare necessities in terms of clothing, toys, and personal items. When her adoptive mother disciplined her, she invariably reminded the client that her biological mother had given her up for adoption because the mother did not want her. She often ridiculed the client as being dumb, fat, difficult, and an unwanted burden.

Obviously, there are many past and immediate factors that must be considered in trying to account for the client's current behavioral patterns. In addition, because many of the events reported in therapy occurred in the past, an experimental analysis of their effects is not possible. It is possible, however, to interpret the client's behavior in line with known behavioral principles. In that regard, it is at least plausible and conceptually justifiable to interpret the mother's harsh treatment of the client as, among other things, a set of establishing operations with long-term effects on the contingencies surrounding the client's interpersonal interactions. By her report, the client had always perceived interpersonal situations as frightening and dangerous. Rather than opportunities to share and interact, she viewed them as situations in which others might discover her intensely embarrassing history and assumed personal flaws. The client believed that, given the opportunity, others would come to see her as dumb, incompetent, awkward, and boring, just as her adoptive mother had. Her history had effectively determined the behavioral function of social interactions for her. They had the potential to become punishing, and events that were correlated with the development of intimacy functioned effectively as discriminative stimuli that evoked avoidance behavior. The client interpreted her previous boyfriend's sexual infidelity as proof that the fears she had about herself and the consequences of social intimacy were well founded. The client's avoidance of social interactions and intimacy also served as an establishing operation. It caused her feelings of loneliness, evoked her binge eating, and eventually led her to therapy.

Verbalizing Distressing Events Reduces Their Impact

Pennebaker (1997) reviewed a series of studies (see also Pennebaker, 1995, and Pennebaker, Colder, & Sharp, 1990) that suggest that simply talking or writing about distressing, emotional, and traumatic experiences can reduce their negative impact and even produce positive outcomes. The emotional experiences in these studies included the death of a spouse, physical assault, the loss of a job, divorce, and physical illness. The positive benefits included fewer visits to therapists and physicians, improved school performance, increased immune function, shorter periods of time to find reemployment after a job loss, enhanced social relationships, and a reduction in self-reported physical and psychological symptoms of distress. Interestingly, these benefits were observed even when the subjects received no feedback from therapists about their disclosures.

We suggest that an adequate behavior-analytic account of these data requires an appeal to the concepts of both stimulus equivalence and the establishing operation. By participating in a stimulus equivalence class (Sidman, 1994) or relational frame of coordination (Hayes, 1991) verbal stimuli can acquire the functions of the events to which they refer or stand for (for a more extended discussion see Dougher & Markham, 1996). In this way, words can bring past (or future) events into the psychological present. Thus, verbalizing past traumatic experiences brings them into the present, where they can occur in a safe context. This can be seen as a verbally based process that can alter both the respondent and operant functions of the verbally described events. As such, it can be understood as an establishing or abolishing operation. As an example, verbalizing previous experiences of child abuse may extinguish the emotional elicitation functions of those experiences as well as alter the reinforcing and evoking functions of relevant contingencies. In this way, the reinforcing effects of hurting others may be abolished (or at least diminished), as would the evocative effects of other people as discriminative stimuli for aggression.

CONCLUSIONS

In this paper we attempted to show the importance of the concept of the establishing operation in providing an adequate behavior-analytic account of some examples of behavior that fall under the general heading of cognition and emotion. In so doing, we focused on clinical data and observations because they provide examples of the kinds of behavioral phenomena that we think have been neglected by behavior analysts but are important to address. In our discussion of establishing operations, we noted the discrepancy between the considerable range of events, situations, and processes that have been mentioned as potential establishing operations and the dearth of conceptual and empirical papers that have addressed the role of establishing operations in the analysis and modification of human behavior. We also questioned the assertion that the effects of establishing operations are momentary, and suggested that their effects could instead be quite long lasting. In that regard, we offered a conceptual account of how some potential establishing operations might have long-term effects on relevant contingencies of reinforcement.

Obviously, this conceptual analysis is much easier to do than actually conducting the necessary empirical analyses to demonstrate the functional relations that have been suggested here. From a research perspective, it is very difficult to separate the effects of selected historical events and operations from the effects of intervening and immediate variables. This is especially true in research with verbally competent, normal humans in which the opportunity to conduct experimental analyses in real-world contexts is quite restricted. This may very well be why there is so little research on establishing operations. As Wahler and Fox (1981) suggest, the conceptual and functional analyses of setting events (establishing operations) may require more molar or global units of analysis and an examination of more temporally distant environment–behavior relations than is typical in behavior-analytic research. Toward this end, they suggest the use of correlational or descriptive research methods when examining events that are not directly manipulable. When possible, these would need to be followed by experimental analyses, but at least they would begin to identify potentially important establishing operations and lead to hypotheses that could be explored through experimental analysis.

If we think that establishing operations are important in understanding complex human behavior, and we argue that they are, then it is clear that we need to develop methods to study them in both laboratory and real-world settings. Clearly this is a challenge, but the potential benefit seems well worth the effort. It is just this kind of research that could demonstrate to nonbehavioral psychologists the relevance and even the advantage of behavior-analytic approaches to important human behavior.

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